UPPER JURASSIC AMMONITE BIOSTRATIGRAPHY IN THE TRANSDANUBIAN CENTRAL RANGE (HUNGARY). PRELIMINARY RESULTS

by

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Abstract

The examined ammonite fauna has been collected from red nodular limestone of Kimmeridgian and Tithonian age from the Bakony Mts. (Transdanubian Central Range). Dominance of Phylloceratina and Lytoceratina, and occurrence of some genera of Ammonitina indicate a Mediterranean character. Ammonitina – forming one-third of the fauna – made possible to recognize Mediterranean biozones.

Introduction

Jurassic rocks of Hungary are comprehensively discussed in several recent reviews (FÜLÖP 1971, GALÁCZ 1985).

In Hungary the main Jurassic occurrences are as follows:

– Largest continuous outcrops are in the Transdanubian Central Range, especially in the Bakony and Gerecse Mts.

– From southern Hungary an extensive Jurassic sequence is known in the Mecsek and Villány Mts.

– In the Bükk Mts. in North-east Hungary the thick clayey-shaley sequence, and in western Hungary, the unfossiliferous, slightly metamorphosed succession are regarded also as Jurassic, but their exact stratigraphic position is unknown.

While the series and the ammonite fauna of the Transdanubian Central Range shows Mediterranean characters, the sequence of the Mecsek Mts. has a strong similarity to NW-European formations.

Although Upper Jurassic formations are known from each large unit, I would like to focus on the outcrops of the Transdanubian Central Range, especially of the Bakony Mts.

Here, the Triassic carbonates are overlain by Lower Jurassic "Ammonitico Rosso" type limestones which are followed by heterochronously appearing cherty, radiolarian-rich siliceous marl which belongs to the Middle Jurassic. Subsequently – in the Upper Jurassic –, the "Ammonitico Rosso" limestones reappear. These ammonite-rich limestones are covered by a white, thinly-bedded limestone and marl of Biancone facies (Upper Tithonian – Lower Berriasian), or by paraconformable Middle Cretaceous (Aptian) limestones.

Regarding the whole Transdanubian Central Range, it could be pointed out, that in the "Upper Ammonitico Rosso" not only the Tithonian, but the Kimmeridgian and Oxfordian stages are represented as well.

Not counting the ammonite studies of G. VIGH, subdivisioning of Upper Jurassic formations and drawing of the Jurassic/Cretaceous boundary has been carried out mostly by microfacies and micropaleontological investigations.

The studies of ammonites revealed that in single profiles the particular stages are usually represented partially, the individual sequences are commonly more or less incomplete. The hiatuses rather vary in time and space.

From the Oxfordian up to the Tithonian the thickness of the succession increases, which is – partly – due to that upwards in the sequences the spans of stratigraphic hiatuses are decreasing.

Richest ammonite assemblages were yielded by the Kimmeridgian and Tithonian. The large Upper Jurassic ammonite fauna collected by the Hungarian Geological Survey, numbers thousands of specimens. These were investigated by G. VIGH. Unfortunately he could not finish his work because of his untimely death. The following comprehensive review was made by using the data of G. VIGH.

The Sümeg profile

Among the examined outcrops this is the most southern. The Oxfordian, Kimmeridgian and Lower Tithonian are very poor in ammonites, thus further subdivision is problematic. The Middle and Upper Tithonian fauna is richer. According to the investigations of G. VIGH (1984) the fauna of the profile shows similarity with Spanish faunas from the Betics.

Within suborder Ammonitina, beyond the generally frequent haploceratids, the most characteristic Lower Tithonian genera are *Semiformiceras, Paraulacosphinctes, Simoceras, Sublithacoceras*. In the Upper Tithonian the Himalaytinae family has a relatively large specimen and species number.

The taxonomy of the represented *Himalayites, Durangites* and *Djurjuriceras* have not worked out yet, but they proved to be very useful index forms in the upper part of the Middle Tithonian.

The Lókút profile

The Jurassic sequence of the Lókút Hill is considered as one of the most complete successions of the Bakony Mts. Among the current 11 Jurassic stages 7 were documented with ammonites and the remaining 4 can be inferred on the basis of facies similarities.

The Middle Jurassic radiolarite is overlain by a thick series of limestones.

According to the partly published, preliminary ammonite investgiations of G. VIGH the succession consists of a few limestone beds belonging

to the Oxfordian, a nearly complete Kimmeridgian and a Tithonian sequence.

In the Kimmeridgian, *Taramelliceras*, *Nebrodites*, *Lithacoceras* and the aspidoceratids are frequent and characteristic. Typical Tithonian genera are *Simoceras*, *Lithacoceras*, *Usseliceras*, *Lemencia*, *Paraulacosphinctes*, *Himalayites*.

On the basins of the rich ammonite fauna it can be stated that all of the zones of the Kimmeridgian and Tithonian are represented in Lókút.

The profile of the Közöskút-ravine

In the Közöskút-ravine, the Upper Jurassic sequences crop out in beautiful exposures.

Although the Kimmeridgian beds are very incomplete here (only the uppermost Beckeri Zone is represented), the Lower and Middle Tithonian are better developed. The common presence of the Hybonotum and Darwini Zones is verified by the occurrence of genera *Neochetoceras*, *Pseudolissoceras*, *Physodoceras* and *Virgatosimoceras*. The Semiforme and Fallauxi Zones are indicated by the zonal indices. A few beds bearing several species of *Simoceras*, were ranged into the Ponti Zone.

The upper part of the succession yielded a Berriasian fauna, so future investigations will furnish data on the Jurassic/Cretaceous boundary, too.

The Szilas-ravine profile

Here the Upper Jurassic fossiliferous limestones occur in the side of a valley. In the trench, excavated by the Geological Survey, the Middle Jurassic radiolarite was also exposed.

The ammonite fauna of the succession is very similar to that in the above mentioned Közöskút-profile. In the Szilas-ravine the H. beckeri beds are overlain by a fairly complete Lower and Middle Tithonian series, which is rich in ammonites.

The investigations are not finished yet, but the upper beds of the profile seems to be range around the Tithonian/Berriasian boundary.

In the Lower and Middle Tithonian the *Neochetoceras*, *Virgatosimoceras*, *Simoceras*, *Subplanitoides*, *Burckhardticeras* genera are characteristic.

In the Tithonian/Berrasian boundary beds several big *Himalayites*, *Corongoceras*, *Malbosiceras* and numerous, very poorly preserved *Berriasella*-like ammonites were found.

The Rendkő profile

Another representative outcrop of the Upper Jurassic limestones is known from the "Rendkő-tető". Here the Ammonitico Rosso type limestones form spectacular cliffs. Detailed, bed by bed collection was

not carried out, however it appears, that most of the Kimmeridgian and Lower Tithonian are missing, or at least their presence coud not be demonstrated with fauna. The Middle Tithonian beds are richer in ammonites. The topmost part of the profile is a light coloured, thinly – bedded limestone with poorly preserved *Berriasella*-like ammonites. Probably these beds belong to the Berriasian.

The general character of the Bakony ammonite fauna

The conclusions are based on the study of thousands of ammonites, wich were collected from the five mentioned sections.

The large proportion of the Lytoceratidae and Phylloceratidae in the fauna could be regarded as a typical Mediterranean character.

Most of the Phylloceratidae belong to *Ptychophylloceras*, namely to *P. semisulcatum*.

In the Lytoceratinae subfamily most common is the genus *Protetragonites*, but some large-sized species (usually ranged into the genus *Pterolytoceras)* are also common.

Regarding the Ammonitina, the high frequency of the Haploceratidae is very conspicuous. In some cases 25 – 50% of the Ammonitina is taken by these forms.

In the upper part of the Lower Tithonian (Verruciferum Zone) good specimens of *H. verruciferum* are very characteristic (pl. II. fig. 4.). It is worth mentioning, that a new large-sized verruciferum like species, which was mentioned hitherto only from the Subbetics by Oloriz (1978) also occurs in the Bakony.

Disregarding haploceratids it could be stated that the other (sub) families of the Ammonitinae show a high genus and species diversity, which could be regarded as a Mediterranean character also.

Several ammonite species are particularly Mediterranean, while a number of other species occur also in the Sub-Mediterranean area.

From the rich ammonite assemblage *Semiformiceras* and *Simoceras* are of particular interest.

The most characteristic *Semiformiceras* is *S. semiforme*. The rich and well-preserved material shown the large intraspecific varibility and the slow gradual morphological change which were observed on the Spanish material by Oloriz (1978) and Enay, 1982). The two figured specimens (both belongs to *S. semiforme)* show considerable differences in coiling, umbilical width and in the character of the marginal tubercules (pl. I. fig. 2. 3.).

It is important that not only the type species, but other congeneric forms are also represented in the Bakony fauna, so the whole phylogenetic linage of the genus (outlined by Enay (1982) could be traced.

Simoceratids are characteristic ammonites of the Mediterranean Lower Tithonian. Among them, there are a few zonal indices too.

In the Bakony material occurred a few well-preserved specimens of *S. volanense* (s. l.), *S. schwertschlageri*, (pl.I.,II. fig. 1., 5.) and frag-

ments of *S. biruncinatum* and *S. admirandum*. The diversified material suggests, that these classical species need revision.

The small characteristic specimens of a *Lytogyroceras* occurred in a single bed of one profile (pl. II. fig.3.).

S. subbeticum, which was recently described from the Spanish material, also occur in Hungary.

Fragments of a few large-sized *Simoceras*-like ammonites have still a problematic taxonomy.

Probably, the future investigations of simoceratids will increase the stratigraphic importance of these well-recognisable group.

Paleoecological evaluation of the associated fauna

The biggest part of the Kimmeridgian and Tithonian megafauna was the ammonites, but during the large collection work a few other fossils were also found. It is interesting that while thousands of ammonites were found in the sequences, only a few other fossils occurred. The non-ammonite fauna is quite poor, only the pygopid brachiopods are common in certain beds.

In the Szilas-ravine sequence, for example, 3554 specimen of ammonites, 274 brachiopods, 27 echinoids, 25 belemnites, 22 bivalves and only one gastropod was found.

On the basis of this material a rich nectonic-planktonic, and a poor benthonic community could be outlined.

In the first group ammonites are most common, and some nearly undeterminable coleoid phragmocones (found in the Rendkő section) belong also here. (pl. III. fig.3).

Among the benthonic forms pygopid brachiopods are most common (Pl. III. fig. 4. 5. 6., but a few *Nucleata* specimens also occurred.

Gastropods are very rare in the Upper Jurassic limestones. Only a single specimen of the genus *Conotomaria* was found in the Tithonian of the Rendkő Hill (pl. III. fig. 1, 2).

In the quite poor bivalve fauna there are shallow and probably deep burrower forms (pl. II. fig. 2.), but some *Inoceramus*-like specimens also occurred.

Common worm tubes (found in the ammonites) suggest, that worms were significant members of the in- and epifauna. It is probable that other groups were living within the sediment, resulting bioturbation.

Hardly determinable irregular echinoids were members of the infauna too (pl. II. fig. 1.).

Conclusions

– The Upper Jurassic fauna of the Bakony Mts. shows significant similarity to the faunas of the Spanish (Subbetic) and in some cases with other Mediterranean and Sub-Mediterranean areas. So the Upper Jurassic ammonite zonation worked out previously in these areas proved to be useful base for the Hungarian Upper Jurassic biostratigraphy.

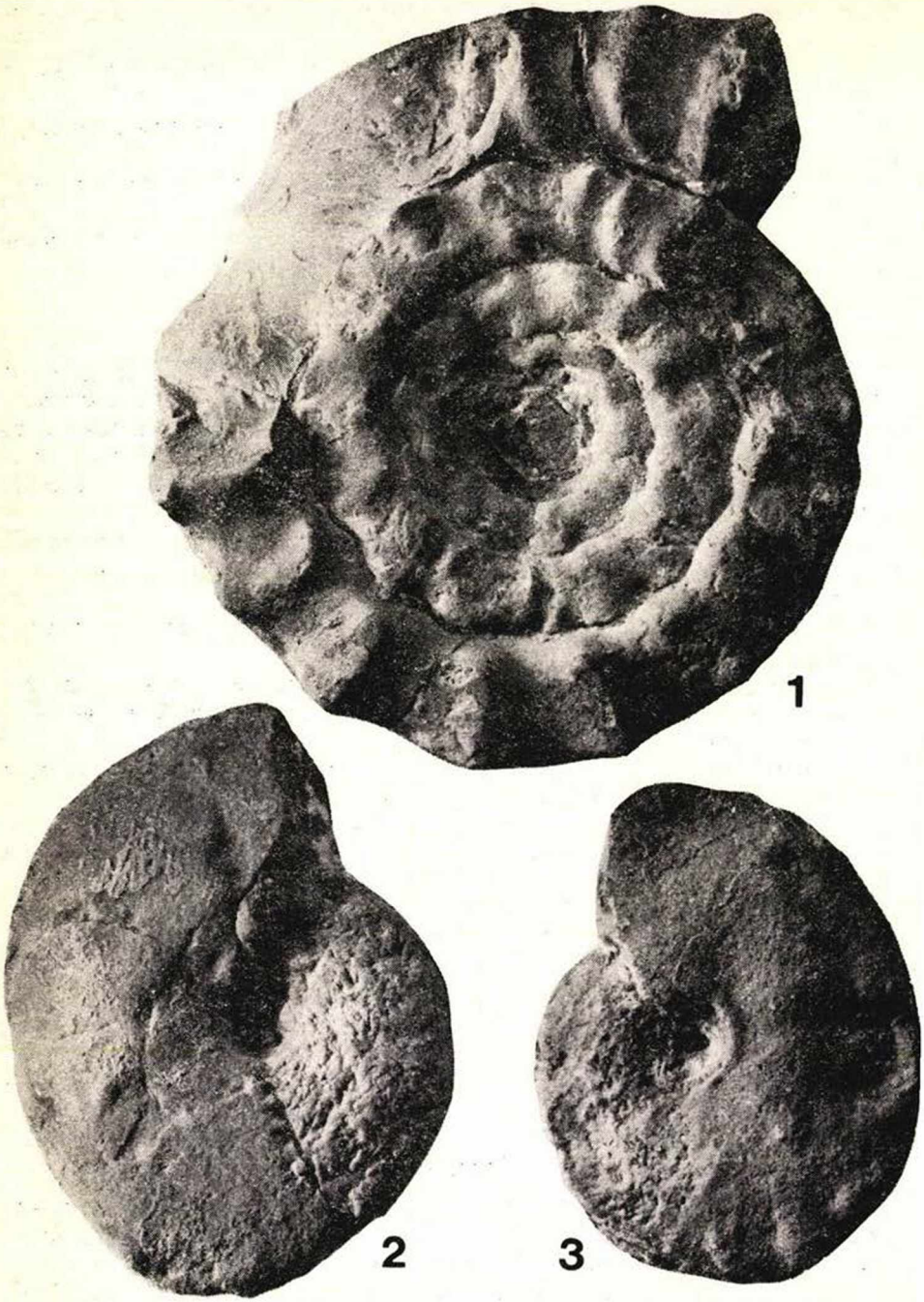
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PLATE I.

Fig. 1. Simoceras aff. *volanense* (OPPEL 1863), Közöskút-ravine, Lower Tithonian, 1x
Fig. 2. Semiformiceras semiforme (OPPEL 1865), Közöskút-ravine, Lower Tithonian, 1x
Fig. 3. Semiformiceras semiforme (OPPEL 1865), Szilas-ravine, Lower Tithonian, 1x

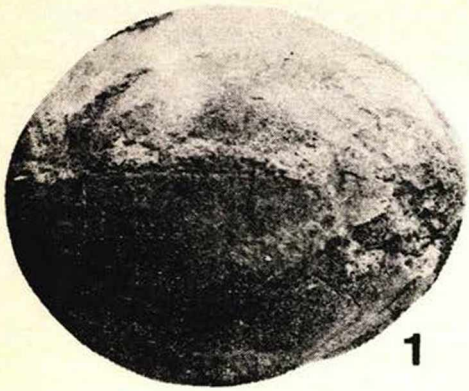

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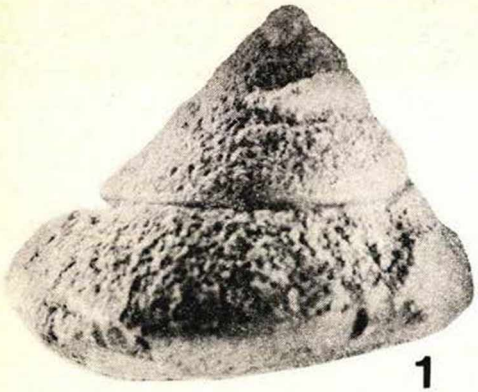
PLATE II.

Fig. 1. Irregular echinoid from the Rendkő Hill: Upper Tithonian, 1x
Fig. 2. Burrower bivalve from the Rendkő Hill: upper part of the Lower Tithonian, 3x
Fig. 3. Lytogyroceras sp.: Közöskút-ravine, Lower-Tithonian 1x
Fig. 4. Haploceras verruciferum MENEGHINI in ZITTEL 1870, Szilas-ravine, Lower Tithonian, 1x
Fig. 5. Simoceras schwertschlageri (SCHNEID 1914), Közöskút-ravine, Lower Tithonian, 1x



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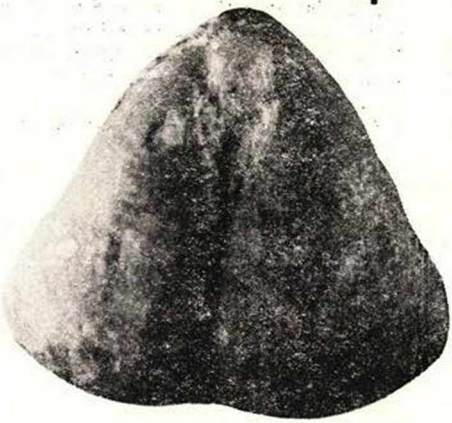

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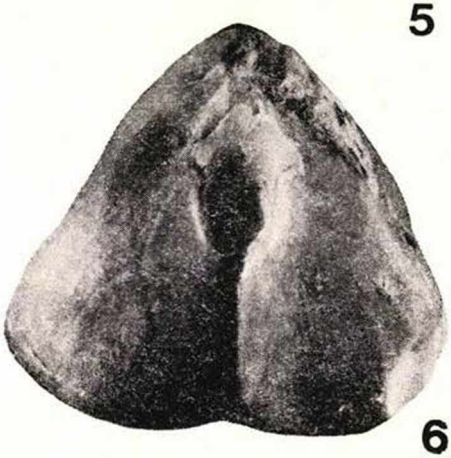

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PLATE III.

Fig. 1. 2. Conotomaria sp. from the Rendkő Hill. Upper Tithonian, 2x
Fig. 3. Coleoid phragmocone from the Rendkő Hill. Middle Tithonian, 1x
Fig. 4. 5. Pygope diphya (Buch 1834) from the Rendkő Hill. Middle Tithonian, 1,5x

– The biostratigraphic study of the five profiles indicates, that the boundary between the Middle Jurassic radiolarite and the Upper Jurrassic limestones is heterochronous. This is in accordance with the previously outlined facies-genetic framework (see GALÁCZ and VÖRÖS 1972).

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